

REMARKS

Claims 1 and 3-7 are pending in the present application. Claim 2 has been cancelled. Claim 1 has been amended by incorporating the subject matter of claim 2 and further incorporates the subject matter found at page 5, lines 28-29. Claims 3-7 have been amended to correct the dependency in view of the cancellation of claim 2. No new matter has been added by way of the above amendments.

Claim Objections

Claims 4-7 have been objected to as being in improper multiple dependent form. These claims have been amended to depend from independent claim 1. Accordingly, the claims should be in proper form.

Issues under 35 USC § 102(b)

Claims 1-3 have been rejected under 35 USC § 102(b) as being anticipated by Barrat et al. (US 4,446,035).

Claims 1 and 2 have been rejected under 35 USC § 102(b) as being anticipated by Clapperton et al. (US 6,177,396).

Claims 1 and 2 have been rejected under 35 USC § 102(b) as being anticipated by Oftring et al. (US 6,380,410).

These rejections are respectfully traversed. Reconsideration and withdrawal are requested.

The present invention

Applicants' invention is directed to an aluminum- or aluminum alloy-cleaning alkaline liquid and a method for alkaline cleaning of aluminum or aluminum alloys. The cleaning liquid contains, in water:

- (A) from 0.2 to 10 g/L of one or more of organic phosphonic acid and its salt,
- (B) from 0.001 to 2 g/L of one or more metallic ions selected from metallic ions having from 5.0 to 14.0 of stability constant with the organic phosphonic acid and its salt,
- (C) from 0.5 to 40 g/L in total of one or more alkali builders selected from alkali metal hydroxide, alkali metal carbonate, inorganic alkali metal phosphate and alkali metal silicate, and
- (D) from 0.1 to 10 g/L of surfactant,

wherein the weight ratio (A):(B) lies within a range of 100:0.05 to 20. Additionally, the metallic ions (B) can be supplied from a variety of sources including: (1) sulfate, carbonate, phosphate, nitrate and the like, (2) the metallic ions present in the water used in the cleaning liquid (with the exception of deionized water), and (3) the metallic ions which dissolve from the aluminum-alloy material during operation. The prior art fails to recognize and appreciate the contribution that sources (2) and (3) make towards the total content of metallic ions in these type of compositions, as discussed in detail below. This is one of the advantages that the present invention offers over the prior art. As a result of this unexpected advantage, the invention is

further characterized in that it maintains a stable etching uniformity even during continuous production.

Conventional alkaline cleaning methods suffer from a lack of uniform, stable etching due to a fluctuation in the amount of the particular metal ion components which are present in the cleaning liquid during continuous production. This fluctuation in metal ion component amounts can be attributed, in part, to the fact that the alkaline cleaning liquid is discarded and replenished during the continuous production. Applicants have discovered that particular metal ion components were already present in the water used for the cleaning liquid, and thus contribute an additional amount of metallic ions to the total content. This is shown in Example 1 at page 10 of the specification where it was found that the city water used in the cleaning liquid of Example 1 contained 0.027 g/L of metal ions. Therefore, when the cleaning liquid is discarded and replenished during continuous production, the amount of metal ion components will increase and decrease as the water is exchanged.

Applicants have further discovered that the variation in the metal ion component amounts present in the cleaning liquid can also be attributed to the fact that metallic ions dissolve from the aluminum alloy material during continuous production. For example, see Table 1 at page 10 of the specification where it was determined that the metal ion content increased from 0.047 g/L prior to cleaning to 0.077 g/L once the cleaning liquid was applied in an operation load. This increase resulted when metal ions in the aluminum alloy material dissolved during the cleaning process. The possibility of metal ion component variation due to dissolved ions from the aluminum alloy was not appreciated by the prior art.

The fluctuation of metal ion quantities in the cleaning liquid directly influences the etching stability and uniformity during continuous operation and, as a result, causes pitting (or localized) corrosion of the aluminum container. See page 3, lines 5-16 where Applicants explain how the metallic ions eventually reach a saturation state during the cleaning process (which varies according to the size of the container to be cleaned). However, up until the saturation state is achieved, the metallic ions can fluctuate for approximately 10 hours during continuous production. In certain instances, 500,000 or more containers may be cleaned during this period of fluctuation, which means that 500,000 or more containers would exhibit pitting corrosion as a result of the metal ion fluctuation. This is an inefficiency in production which the present invention has overcome.

Evidence of Applicants' unexpectedly improved results can be seen at page 8, lines 31-32 of the instant specification. There, Process [2] is described wherein 10 aluminum cans were treated in 100 batches for 60 seconds with a cleaning liquid of the present invention. After the cleaning process was complete, the etching uniformity was determined by scanning type electron microscope (SEM) to determine the number of pits observed. Tables 13 and 14 at page 21 present these results. Specifically, it was found that the process of the invention resulted in fewer than 10 pits which was a significant improvement over the comparative examples which often had 16 or more pits. Accordingly, the alkaline cleaning liquid of the instant invention can be used in continuous production with various water sources and still maintain etching uniformity. This holds true throughout the cleaning process even as the metal ions fluctuate from the beginning of the process (when the metal ions are either absent or are present in smaller

amounts) to the end of the process (at which point the metal ions have enriched due to dissolution from the aluminum alloy).

Barrat et al.

Barrat discloses a detergent composition of Example 1 at col. 7 which contains similar components to those found in the compositions of the claimed invention. However, the amounts of these components vary from that presently claimed. Note that the amount of organic phosphonic acid (when taking into account the 1.2% dilution in water) is 0.036 g/L whereas the instant claims limit the phosphonic acid or its salt to 0.2 to 10 g/L. Additionally, the metallic ions are present at 0.00096 g/L (accounting for the 1.2% dilution) in Barrat as compared to a range of 0.001-2 g/L in the composition of the invention. For clarity, this comparison is presented in Table A below. It is evident that Barrat does not account for the metallic ions already present in the water used in the detergent composition since the footnote (b) to the table in Example 1 notes that the calculation of the amount of calcium chloride is based on the calcium chloride added to the composition and is not based on any amounts already present within the water.

Barrat also fails to disclose the method for cleaning aluminum or aluminum alloy as recited in instant claim 7 as well as the use of potassium as the alkali metal as recited in claim 5. Accordingly, since all features of the present invention are not disclosed in Barrat et al., Applicants' invention is not anticipated by Barrat, and Applicants respectfully request that the rejection under 35 USC § 102(b) be withdrawn.

Clapperton et al.

Clapperton describes in Example 22 a composition which is similar to the present invention. However, as shown in Table A below, Clapperton fails to disclose an alkali component within the range of that recited in Applicants' claim 1. When accounting for the 1% dilution, the amount of the alkali component (KOH) present in the composition of Clapperton is 0.338 g/L which falls outside the scope of the invention (0.5-40 g/L). Clapperton discloses at col. 37, line 33 that the composition of Example 22 was diluted in water, thereby possibly introducing additional metal ions into the composition. Clearly, Clapperton did not account for the possibility of metal ions already present in the formulation from the water used therein since the ingredients, including the metal ions, are described as being "mixed" in the preparation (see col. 37, line 15). Additionally, Clapperton fails to disclose a method for cleaning aluminum or aluminum alloy as recited in claim 7 as well as the use of potassium as the alkali metal as recited in claim 5. Accordingly, since all features of the present invention are not disclosed in Clapperton et al., Applicants' invention is not anticipated by Clapperton, and Applicants respectfully request that the rejection under 35 USC § 102(b) be withdrawn.

Oftring et al.

Oftring discloses detergent compositions exemplified by Example M which contains 0.5% magnesium silicate as the metal ion corresponding to that instantly claimed. When the 0.5% dilution is factored into the calculation of component amounts of Oftring, the amount of organic phosphonic acid present in the detergent composition is determined to be 0.01 g/L, which is outside the instantly claimed range of 0.2-10 g/L. Additionally, the ratio of organic

phosphonic acid and its salt to metal ions (A:B) falls outside the scope of Applicants' invention as can be seen below in Table A. Oftring further fails to disclose the use of potassium as the alkali metal as recited in claim 5. Accordingly, since all features of the present invention are not disclosed in Oftring et al., Applicants' invention is not anticipated by Oftring, and Applicants respectfully request that the rejection under 35 USC § 102(b) be withdrawn.

Table A

Component concentration (g/L)	Present Invention	Barrat (Ex. I)	Clapperton (Ex. 22)	Oftring (Ex. M)
Alkali component	0.5-40	not defined	0.338	0.6
Organic Phosphonic Acid and its Salt (A)	0.2-10	0.036	0.4	0.01
Metallic Ions (B)	0.001-2	0.00096	0.0072	0.008625
Surfactant	0.1-10	3.48	3	1.05
(A)/(B)	5-2000	37.5	55.6	1.16
Dilution (%)	not defined	1.2	1	0.5

Issues under 35 USC § 102(e)

Claims 1-3 have been rejected under 35 USC § 102(e) as being anticipated by Miracle et al. (US 2006/0089284).

Claims 1-3 have been rejected under 35 USC § 102(e) as being anticipated by Dykstra et al. (US 6,903,060).

These rejections are respectfully traversed. Reconsideration and withdrawal thereof are requested.

Miracle et al.

Miracle discloses a detergent composition at Example A in paragraph 94. This composition contains similar components to the composition of the invention, but fails to disclose organic phosphonic acid within the claimed range and further fails to disclose the ratio of organic phosphonic acid and its salt to metal ions (A:B) as claimed. The phosphonic acid content in the Miracle composition is 0.02 g/L which is outside the scope of Applicants range of 0.2-10 g/L. Miracle's ratio of A:B is 2.38 which is less than the minimum value recited by Applicants. Please note Table B below where this data is presented for clarity. Additionally, Miracle fails to describe Applicants' claim 5 subject matter which requires that 60% or more of the alkali metal hydroxide and alkali metal carbonate in terms of alkali metal mole ratio is potassium.

Since Miracle fails to disclose all of the features of the claimed invention, Miracle consequently fails to anticipate Applicants' claims. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Dykstra et al.

Dykstra discloses Example XVIA as a species which is similar to the present invention. However, as in Miracle, Dykstra fails to disclose an amount of organic phosphonic acid component within the claimed range and further fails to disclose Applicants' claimed ratio of organic phosphonic acid and its salt to metal ions (A:B) as claimed. Note that the amount of phosphonic acid present in the composition is 0.00525 g/L when the 0.35% dilution is taken into account. Nor does Dykstra describe Applicants' claim 5 subject matter which requires that 60% or more of the alkali metal hydroxide and alkali metal carbonate in terms of alkali metal mole ratio is potassium.

Since Dykstra fails to disclose all of the features of the claimed invention, Dykstra consequently fails to anticipate Applicants' claims. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Table B

Component concentration (g/L)	Present Invention	Miracle (Ex. A)	Dykstra (Ex. XVI-A)
Alkali component	0.5-40	1.5	0.735
Organic Phosphonic Acid and its Salt (A)	0.2-10	0.02	0.00525
Metallic Ions (B)	0.001-2	0.0084	0.00245
Surfactant	0.1-10	1.2	0.42
(A)/(B)	5-2000	2.38	2.14
Dilution (%)	not defined	1	0.35

In summary, Applicants assert that each of the references applied in the rejections under 35 USC § 102 fail to set forth each feature of Applicants' invention, namely items (A)-(D) as recited in claim 1, as well as the (A):(B) ratio claimed. Additionally, none of the references account for, or even appreciate, the quantity of metallic ions which can be introduced into a cleaning solution by way of the water used in the solution or from the dissolution of metallic ions from the aluminum or aluminum alloy during the cleaning process. Accordingly, since each reference fails to anticipate Applicants invention, the rejections under 35 USC § 102 should be withdrawn.

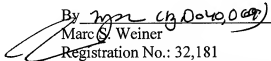
In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Marc S. Weiner, Reg. No. 32,181 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

By 
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